UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,666	01/16/2002	John C. Hardwick	03397-036001	1168

26171 7590 03/04/2008

FISH & RICHARDSON P.C.
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
WOZNIAK, JAMES S	

ART UNIT	PAPER NUMBER
2626	

MAIL DATE	DELIVERY MODE
03/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/046,666
Filing Date: January 16, 2002
Appellant(s): HARDWICK, JOHN C.

John F. Hayden
Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 2005-3500
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/27/2007 appealing from the Office action mailed 2/27/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,701,390 GRIFFIN 12-1997

Barnwell et al. "Speech Coding: A computer laboratory textbook" 1966, John Wiley & Sons, Inc. pp. 4-7

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

1. Claims 1-75 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1 and 38 preempt abstract ideas and do not appear to result in a practical application (i.e., produce a useful, concrete or tangible result; see "Interim

Guidelines for Examination of Patent Applications for Paten Subject Matter Eligibility" pp. 1, 23, 58). In these cases, the end result is a combining of first signal samples with second signal samples, which is not useful, concrete, or tangible.

Claims 2-37 and 39-75 are rejected for failing to cure the deficiencies of the above rejected nonstatutory claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6, 16, 27, 28, 37-41, 43, 44, 59, 60, 62 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griffin et al. (U.S. Patent 5,701,390), hereinafter referred to as Griffin, in view of Barnwell et al. ("Speech Coding: A computer laboratory textbook," 1966, John Wiley & Sons, Inc.), hereinafter referred to as Barnwell.

Regarding **claim 1**, Griffin discloses a method for the synthesis of MBE-based coded speech using regenerated phase information. Griffin's method includes the following:

- dividing the speech model parameters into frames, wherein a frame of speech model parameters includes pitch information, voicing information determining the voicing state in one or more frequency regions, and spectral information (col. 3, lines 4-12; col. 9, lines 28-35);
- computing a first digital filter using a first frame of speech model parameters, wherein the frequency response of the first digital filter corresponds to the spectral information in frequency regions where the voicing state equals the selected voicing state (Fig. 2, col. 4, lines 38-65; digital filters are used to synthesize the speech, excited by the appropriate input [v/uv]); and col. 13, line 60 through col. 14, line 7);
- computing a second digital filter using a second frame of speech model parameters, wherein the frequency response of the second digital filter corresponds to the spectral information in frequency regions where the voicing state equals the selected voicing state (Fig. 2, col. 4, lines 38-65; parameters from sequential packets are loaded creating different filters, which are excited according to voicing state; and col. 13, line 60 through col. 14, line 7, sequential packets can overlap).
- combining the first signal samples with the second signal samples to produce a set of digital speech samples corresponding to the selected voicing state (Fig. 2, Synthetic speech produced).

As stated above, Griffin teaches the use of multiple filters (with spectral and fundamental frequency information during the synthesis process [col. 4, lines 55-59] where it might be argued that the use of fundamental frequency information determines a set of pulse locations), but Griffin does not specifically teach the following:

- determining a set of pulse locations;
- producing a set of first signal samples from the first digital filter and the pulse locations;
- producing a set of second signal samples from the second digital filter and the pulse locations;

However, the examiner contends that these concepts were well known in the art, as taught by Barnwell.

In the same field of endeavor, Barnwell teaches speech coding where a filter is "programmed" with coefficients and excited with pulses (pp. 85-89, Fig. 5.2), where the pulses will necessarily have a separation (pitch period—location) and sequential sets of samples (from frames or subframes) will produce a signal.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Griffin by specifically providing the features, as taught by Barnwell, because it is well known in the art at the time of invention for the purpose of producing synthesized speech at a decoder using low bandwidth transmissions (Barnwell, p. 85, Introduction), and furthermore Barnwell illustrates (clarifies) the connection between the fundamental frequency (as taught by Griffin) and pulse locations as claimed when used to excite a filter (programmed with spectral information) during a voiced state. Barnwell also illustrates the sequential nature of the process: a first set of spectral coefficients program the first digital filter and when excited produce the first set of signal samples; the second set of spectral coefficients

program the second filter and when excited produce the second set of signal samples, etc. These outputs are combined to produce the reconstituted digital signal.

Regarding **claim 2**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 1). In addition, Griffin teaches "wherein the frequency response of the first digital filter and the frequency response of the second digital filter are zero in frequency regions where the voicing state does not equal the selected voicing state" (col. 13, line 62 through col. 14, line 6).

Regarding **claim 3**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 2). In addition, Griffin teaches "wherein the spectral information includes a set of spectral magnitudes representing the speech spectrum at integer multiples of a fundamental frequency" (col. 4, lines 55-61).

Regarding **claim 4**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 2). In addition, Griffin teaches "wherein the speech model parameters are generated by decoding a bit stream formed by a speech encoder" (col. 9, lines 26-30).

Regarding **claim 5**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 2). In addition, Griffin teaches "wherein the voicing

information determines which frequency regions are voiced and which frequency regions are unvoiced" (col. 13, line 60 through col. 14, line 5).

Regarding **claim 6**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 5). In addition, Griffin in view of Barnwell (see rejection of claim 1) teaches "wherein the selected voicing state is the voiced voicing state and the pulse locations are computed such that the time between successive pulse locations is determined at least in part from the pitch information" (in particular, Barnwell, Fig. 5.2, the pitch period determines the space between the excitation pulses).

Regarding **claim 16**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 2). Barnwell teaches "wherein the selected voicing state is a pulsed voicing state" (p. 88, Fig. 5.2, voiced excitation can be generated by a pulse generator in support of low bandwidth transmission, see claim 1 rejection).

Regarding **claim 27**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 1). In addition, Griffin teaches "wherein the spectral information includes a set of spectral magnitudes representing the speech spectrum at integer multiples of a fundamental frequency" (col. 4, lines 55-60).

Regarding **claim 28**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 1). In addition, Barnwell teaches "wherein the speech model

parameters are generated by decoding a bit stream formed by a speech encoder" (col. 3, lines 4-22).

Regarding **claim 37**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 1). In addition, Griffin teaches "wherein the digital speech samples corresponding to the selected voicing state are further combined with other digital speech samples corresponding to other voicing states" (Fig. 2, col. 13, line 62 through col. 14, line 7).

Regarding **claim 38**, this claim has limitations similar to claim 1 and is rejected for the same reasons.

Regarding **claim 39**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 38). In addition, Griffin teaches "wherein the digital speech samples for the subframe corresponding to the selected voicing state are further combined with digital speech samples for the subframe representing other voicing states" (Fig. 2, col. 13, line 62 through col. 14, line 7).

Regarding **claim 40**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 39). In addition, Griffin teaches "wherein the voicing information includes one or more voicing decisions, with each voicing decision

determining the voicing state of a frequency region in the subframe" (col. 13, line 62 through col. 14, line 7).

Regarding **claim 41**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 40). In addition, Griffin teaches "wherein each voicing decision determines whether a frequency region in the subframe is voiced or unvoiced" (col. 13, line 62 through col. 14, line 7).

Regarding **claim 43**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 41). In addition, Barnwell teaches "wherein each voicing decision further determines whether a frequency region in the subframe is pulsed" (Fig. 5.2 voicing selected the pulse generator that generates the appropriate frequency response when passed through the filter.

Regarding **claim 44**, Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 41). In addition, Griffin in view of Barnwell teach "wherein the selected voicing state is the voiced voicing state and the pulse locations depend at least in part on the decoded pitch information for the subframe" (Griffin, Fig. 2, decodes information resulting in V_k going to "voicing band determination" module; Barnwell, Fig. 5.2, pitch and voicing information go to pulse generator).

Regarding **claim 59**, this claim has limitations similar to claim 40 and is rejected for the same reasons.

Regarding **claim 60**, this claim has limitations similar to claim 41 and is rejected for the same reasons.

Regarding **claim 62**, this claim has limitations similar to claim 43 and is rejected for the same reasons.

Regarding **claim 63**, this claim has limitations similar to claim 44 and is rejected for the same reasons.

3. Claims 7, 42, 45, 46, 49, 61, 64, 65 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griffin in view of Barnwell and further in view of well known prior art (MPEP 2144.03).

Regarding **claims 7, 42, 45, 61 and 64** Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 6, 41, 60, 63, respectively), but Griffin in view of Barnwell does not specifically teach "the pulse locations are reinitialized if consecutive frames or subframes are predominately not voiced, and future determined pulse locations do not substantially depend on speech model parameters corresponding to frames or subframes prior to such reinitialization." However, the examiner takes

official notice of the fact that reinitialization after a period of non-pulsed operation was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Griffin in view of Barnwell, because voiced operation is more accurate of the pulses are synchronized to the beginning of a voiced segment.

Regarding **claims 46, 49, 65 and 68** Griffin in view of Barnwell teaches everything claimed, as applied above (see claim 45, 43, 63, and 62, respectively), but Griffin in view of Barnwell does not specifically teach "the frequency responses of the first impulse response and the second impulse response correspond to the decoded spectral information in voiced frequency regions and the frequency responses are approximately zero in other frequency regions." However, the examiner takes official notice of the fact that a pulsed excitation will generate a frequency response and that the non-voiced segments will typically have a much lower energy response.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Griffin in view of Barnwell, because voiced operation is more accurate of the pulses are synchronized to the beginning of a voiced

(10) Response to Argument

A. Section 101 Rejection

Appellants assert on page 4 arguments regarding the tangibility of the claimed subject matter. The examiner responds: claims 1-77 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter. These claims are drawn to an algorithm, per se, or program performing such or a medium resulting from such. In this case, independent claims 1 and 38 recite the final step of "combining the first signal samples with the second signal samples to produce a set of digital speech samples corresponding to the selected voicing state." Thus signal samples are combined but there is no limitation indicated how these samples are made tangible, and as stated in the MPEP (§2106) the claimed invention must produce a useful, concrete **and tangible results**.

B. Section 103 Rejection

4. Appellants assert on page 5:

> Griffin (U.S. Patent No. 5,701,390), which is commonly assigned with the present application, is directed to a multi-band excitation ("MBE") system that, like claim 1, employs frames of speech model parameters that include pitch information, voicing information, and spectral information. However, Griffin does not describe or suggest the recited computing of first and second digital filters, or the recited use of the digital filters, along with pulse locations, to produce sets of first and second digital samples that arc combined to produce a set of digital speech samples.

5. And further, beginning at the top of page 6, Appellants assert:

> Barnwell, which is a chapter from a textbook on speech coding that describes a pitch- excited linear predictive coder ("LPC"), also fails to describe or suggest the recited computing and use of first and second digital filters.

As stated in the rejections of claims 1 and 38, Barnwell teaches the use of multiple filters where **each filter is sequentially programmed** with coefficients and excited with pulses (pp. 85-89, Fig. 5.2). In other words, although a single computational block is indicated, each time that computational block is programmed it represents a different filter ("a first and a second filter"). This teaching is combined with Griffin in the "Voiced Synthesis" block (Fig. 2, note "Voice Synthesis" bock has parameters and fundamental frequency [voicing information] as inputs) to produce synthetic speech.

6. Appellants assert on page 6:

> In the final action, the Examiner responds to this argument, which was previously raised by appellant, by noting that (1) the passage describes the generation of voicing information using regenerated spectral phase information and (2) Barnwell is included to support the use of pulse locations. As to the Examiner's first point, while appellant agrees that the passage describes the generation of voicing information, such generation of voicing information does not involve computing first and second filters and *has nothing to do with the passage's statement that unvoiced frequency band components may be generated from a filter response to a random noise signal.* As to the Examiner's second point, Barnwell is addressed below. (Italics added)

Griffin also describes the use of voiced information (Fig. 2, ω_0; col. 4, lines 55-65, fundamental frequency and voicing information).

7. Appellants assert starting on page 6:

> The Examiner responds to this argument, which was previously raised by appellant, by arguing that (1) Barnwell describes the relationship between fundamental frequency and pitch, (2) Barnwell describes how a train of pitch pulses can be used to excite a digital filter to produce a voiced signal, (3) Griffin teaches that fundamental frequency information is used (not just random noise), and (4) Barnwell describes a pulse generator that generates pulses corresponding to voiced speech and a noise generator that generates a random noise signal corresponding to unvoiced speech. As to the Examiner's third point, as noted above, while Griffin describes the use of fundamental frequency information, *Griffin does not describe the use of this information in conjunction with Griffin's use of a filter response to a random noise signal to generate unvoiced frequency components.* (Italics added)

See above arguments. The examiner notes that there is no mention in the claim language of the use of "a random noise signal", and that this is not the specific teaching is being referred to in Griffin by the rejections. Griffin, in Figure 2, shows two computational blocks (filters). In the "voiced synthesis" block parameters and fundamental frequency [voicing] information are used to generate synthetic speech, where the sequential application of the parameters defines multiple filters.

8. Appellants assert on page 8:

> The Examiner responds to this argument, which was previously raised by appellant, by stating that (1) Griffin teaches the generation of synthetic speech with the input of fundamental frequency and spectral (coefficient) information where a filter is defined by the coefficients used to program it (Fig. 2), (2) that, since each frame corresponds to spectral information, sequential frames will define sequential filters (hence a first and second filter), and (3) that Barnwell further clarifies the connection between pulse locations (and fundamental frequency) and the excitation of a digital filter.

> As to the Examiner's first point, and as discussed above, Griffin does not describe the use of a filter in the manner argued by the Examiner. *As to the Examiner's second and third points, under the Examiner's own logic, if sequential frames could be said to have different filters as a result of their having different spectral information, they would also have different pulse locations as a result of having different fundamental frequencies, such that the different filters would not be used in conjunction with the same pulse locations to produces sets of first and second digital samples.* (Italics added)

See previous argument. Barnwell illustrates how a digital filter can be defined by filter parameters and driven by pitch period estimates (Fig. 1.2) where each sequential set of parameters necessarily defines a new filter. Regarding the Appellants' last statement "... *under the Examiner's own logic, if sequential frames could be said to have different filters as a result of their having different spectral information, they would also have different pulse locations as a result of having different fundamental frequencies, such that the different filters would not be used in conjunction with the same pulse locations to produces sets of first and second digital samples",* the examiner notes that this same argument applies to the Appellants' invention. Claim 1 has the limitation "determining a set of pulse locations" where "the pulses locations" are used by the first and the second set of digital samples.

9. Appellants assert the lack of motivation for combining Griffin and Barnwell starting on page 9.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Barnwell illustrates a well-known technique for synthesizing speech.

Furthermore, "[T]he test [for obviousness] is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller,* 642 F.2d 413, 425 (CCPA 1981). "The combination of familiar elements according to know methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.,* 127 s. Ct. 1727, 1739 (2007); *id.* at 1739-40 ("if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar device in the same way, using the technique is obvious unless its actual application is beyond his or her skill"). In this case, the inputting pitch periods (pulse locations) and parameters into a digital filter can be used to produce synthesized speech.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

V. Paul Harper

V. PAUL HARPER
PRIMARY PATENT EXAMINER

Conferees:

PATRICK N. EDOUARD
SUPERVISORY PATENT EXAMINER

Patrick Edouard

Tālivaldis I. Šmits

V. Paul Harper